

What is claimed is:

1. A system for geolocating a cellular phone, said system comprising:

a base station having a processor;

5 a plurality of dispersed transmitters for transmitting respective beacon signals from respective known locations, wherein each said beacon signal has an identifying characteristic for said respective transmitter;

10 a receive channel incorporated into said cellular phone, with said receive channel being activated to receive phase information from said beacon signals whenever said cellular phone dials a predetermined number; and

15 a means for passing said identifying characteristic and said phase information for each said beacon signal to said base station for use by said processor in determining the geolocation of said cellular phone.

2. A system as recited in claim 1 wherein said predetermined number is 911.

3. A system as recited in claim 1 wherein said identifying 20 characteristic is a frequency of said beacon signal.

4. A system as recited in claim 1 wherein said identifying characteristic is a code on said beacon signal.

5. A system as recited in claim 1 wherein at least one said transmitter is an AM radio station.

6. A system as recited in claim 1 further comprising calibration means to verify the accuracy of said system.

7. A system as recited in claim 1 further comprising a means for synchronizing each transmitter.

5 8. A system as recited in claim 7 wherein said synchronizing means comprises a common time reference supplied to each transmitter from a Global Positioning System (GPS).

9. A system as recited in claim 7 wherein said synchronizing means comprises a plurality of atomic clocks to provide a common time
10 reference to each transmitter.

10. A system as recited in claim 1 wherein each said beacon signal has a wavelength longer than 150 meters to allow each said beacon signal to penetrate structures.

11. A system as recited in claim 1 wherein at least one said
15 transmitter is configured to transmit a plurality of beacon signals of differing frequency.

12. A system for geolocating a cellular phone in an urban area, said system comprising:

- 5 a plurality of dispersed transmitters for transmitting respective beacon signals into the urban area from respective known locations, wherein each said beacon signal has an identifying characteristic for said respective transmitter and each said beacon signal has a wavelength longer than 150 meters to allow each said beacon signal to penetrate structures in the urban area;
- 10 a means coupled with the cellular phone for receiving said beacon signals and extracting phase information and said identifying characteristics from each said beacon signal; and
- a means for using said phase information and said identifying characteristics to geolocate the cellular phone.

13. A system as recited in claim 12 wherein said means for using said phase information in said beacon signals to calculate the location of the target comprises a processor configured to process a Maximum Likelihood Method (MLM) algorithm to eliminate phase-related location ambiguities.

14. A system as recited in claim 12 wherein said means coupled with the cellular phone for receiving said beacon signals and extracting phase information and said identifying characteristics from each said beacon signal comprises a receive channel incorporated into said cellular phone, with said receive channel being activated to receive said beacon signals whenever said cellular phone dials a predetermined number.

15. A system as recited in claim 12 further comprising a means for synchronizing each transmitter.

16. A system as recited in claim 15 wherein said synchronizing means comprises a common time reference supplied to each transmitter from a Global Positioning System (GPS).

17. A method for geolocating a cellular phone within a service area,
5 said method comprising the steps of:

transmitting beacon signals into the service area from a plurality of dispersed predetermined locations, each beacon signal having a different identifying characteristic;

10 receiving said beacon signals at the cellular phone;
extracting phase information and said identifying characteristic from said beacon signals; and

using said phase information and said identifying characteristic to determine the position of said cellular phone.

18. The method as recited in claim 17 wherein said receiving step
15 comprises the step of activating a receive channel whenever said cellular phone dials a predetermined number.

19. The method as recited in claim 17 wherein said step of using
said phase information and said identifying characteristic to determine the position of said cellular phone comprises the step of calculating a pair-wise
20 phase difference for at least two pairs of said beacon signals received at the cellular phone.

20. The method as recited in claim 17 wherein each said beacon signal has a wavelength longer than 150 meters to allow each said beacon signal to penetrate structures.